



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/687,288	10/15/2003	Wang Yuch	42P17301	7538

8791 7590 09/27/2006

BLAKELY SOKOLOFF TAYLOR & ZAFMAN
12400 WILSHIRE BOULEVARD
SEVENTH FLOOR
LOS ANGELES, CA 90025-1030

EXAMINER

CHACKO DAVIS, DABORAH

ART UNIT	PAPER NUMBER
----------	--------------

1756

DATE MAILED: 09/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/687,288

Applicant(s)

YUEH ET AL.

Examiner

Daborah Chacko-Davis

Art Unit

1756

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 August 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>08/06</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on Aug 14, 2006, has been entered.

Claim Objections

2. Claims 1-9, and claim 14, are objected to because of the following informalities: Claim 1, at line 10, recites "non-chemical~amplified photoresist layer." Claim 14, at line 1, recites "The non-chemical v amplified photoresist". Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-5, 7, and 10-14, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent 5,759,739 (Takemura et al., hereinafter referred to as

Takemura) in view of U. S. Patent Application Publication No. 2005/0074699 (Sun et al., hereinafter referred to as Sun).

Takemura, in the abstract, in col 1, lines 10-13, in col 3, lines 30-37, in col 4, lines 3-14, in col 5, lines 1-24, in col 6, lines 66-67, in col 7, lines 1-30, discloses a process of patterning features on the substrate (super LSIs) by forming a photoresist layer on the substrate (integrated device to be fabricated), wherein the photoresist includes an alkali-soluble resin, and a photoacid generator (photoactive), exposing the photoresist layer to EUV (excimer radiations) such that selected portions (exposed portions) are rendered soluble in the developer (during the developing process) by the acid generated by the photoacid generator during exposure, and the unexposed portions are inhibited from being rendered soluble in the developer (claims 1, 3, 7, 10, and 12). Takemura, in col 4, lines 3-6, discloses that the alkali-soluble resin is polyhydroxystyrene (claims 2, and 11). Takemura, in col 10, lines 43-47, discloses that the photoactive agent contains a phenyl group (claims 4, and 13). Takemura, in col 5, lines 20-24, discloses that the acid unstable group is a carbonyl group (claims 5, and 14).

The difference between the claims and Takemura is that Takemura does not disclose that the photoresist layer is non-chemically amplified.

Sun, in [0039], discloses that the chemically amplified photoresist layer can be replaced with a non-chemically amplified photoresist layer.

Therefore, it would be obvious to a skilled artisan to modify Takemura by replacing the photoresist layer of Takemura with a non-chemically amplified resist layer

as suggested by Sun, because Sun, in [0039], discloses that the non-chemically amplified photoresist layer can be used for performing photolithographic processes in a shorter wavelength range (less than 365nm).

5. Claims 1, 6-7, 10, and 15, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 5,358,599 (Cathey et al., hereinafter referred to as Cathey) in view of U. S. Patent Application Publication No. 2005/0074699 (Sun et al., hereinafter referred to as Sun).

Cathey, in the abstract, in col 3, lines 36-68, and in col 4, lines 5-44, in col 6, lines 18-20, discloses a process of patterning a semiconductor device in a lithography tool, the device including a plurality of structural layers by forming a photoresist layer on the structural layers, wherein the photoresist includes a photoactive compound that prevents selected portions of the resist from being solubilized by the developer, exposing the resist to UV radiation (EUV), and said acid generator renders selected portions (unexposed non-crosslinked portion) of the resist soluble in the developer during the development step (claims 1, 7, and 10). Cathey, in col 4, lines 40-44, disclose that the resin is a poly vinyl phenol resin (claims 6, and 15).

The difference between the claims and Cathey is that Cathey does not disclose that the photoresist layer is non-chemically amplified.

Sun, in [0039], discloses that the chemically amplified photoresist layer can be replaced with a non-chemically amplified photoresist layer.

Therefore, it would be obvious to a skilled artisan to modify Cathey by replacing the photoresist layer of Cathey with a non-chemically amplified resist layer as suggested by Sun, because Sun, in [0039], discloses that the non-chemically amplified photoresist layer can be used for performing photolithographic processes in a shorter wavelength range (less than 365nm).

6. Claims 8-9, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 5,358,599 (Cathey et al., hereinafter referred to as Cathey) in view of U. S. Patent Application Publication No. 2005/0074699 (Sun et al., hereinafter referred to as Sun) as applied to claims 1, 6-7, 10, and 15, above, and further in view of U. S. Patent Application Publication No. 2004/0204328 (Zhang et al., hereinafter referred to as Zhang).

Cathey in view of Sun is discussed in paragraph no. 3.

Cathey, in the abstract, in col 3, lines 36-68, in col 4, lines 5-44, in col 5, lines 1-10, and in col 6, lines 18-44, discloses a process of patterning a semiconductor device in a lithography tool, the device including a plurality of structural layers (metal layers), patterning the photoresist layer formed on the structural layers to form a photoresist etch mask, wherein the photoresist etch mask is used to etch the exposed structural layers underlying the mask, followed by stripping the remaining photoresist mask (claim 8).

The difference between the claims and Cathey in view of Sun is that Cathey in view of Sun does not disclose that the patterns formed in the device have a critical

dimension of approximately 15 nm. Cathey in view of Sun does not disclose that the line wide roughness of the feature is less than 2 nanometers (claim 9).

Zhang, in [0019], discloses that the features formed in the device have a critical dimension less than 2nm, and a line width roughness of less than 2nm, and that the line width roughness is within 8% of the critical dimension.

Therefore, it would be obvious to a skilled artisan to modify Cathey in view of Sun by employing the method of patterning taught by Zhang, because Zhang, in [0019], discloses modifying the photoresist formulation and adjusting the latent image results in a pattern of reduced roughness.

Response to Arguments

7. Applicant's arguments filed August 14, 2006, have been fully considered but they are not persuasive. The 103 rejections made in the previous office action (paper no. 0504) are maintained.

A) Applicant argues that Sun absolutely does not teach or suggest the particular non-chemically amplified photoresist recited in claim 1 or 10.

Takemura and Cathey are depended upon to disclose the particular resist layer formed on the film layer. Although Takemura and Cathey does not refer to the resist layer as non-chemically amplified, both Takemura and Cathey teach a resist layer that has the same components of the resist layer recited in claims 1, and 10. Sun is merely depended upon to disclose the interchangeability and/or replaceability of a chemically amplified with a non-chemically amplified resist layer.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daborah Chacko-Davis whose telephone number is (571) 272-1380. The examiner can normally be reached on M-F 9:30 - 6:00. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark F Huff can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

dcd

September 22, 2006.



JOHN A. MCPHERSON
PRIMARY EXAMINER